

Claims

1. The combination of: a workpiece steady in the flow path of a workpiece delivery conveyor to handle workpieces carried by a decorator conveyor of a decorating machine; a plurality of workpiece stabilizers to drivingly support workpieces during a change to a

5 workpiece speed of travel along said workpiece delivery conveyor, each of the workpiece stabilizers including a cam follower and stabilizer guides; and at least one workpiece drive cam having a cam track receiving said cam followers for changing the speed of travel by workpieces between an entry speed and a discharge speed, one such speed corresponds to and the other speed differs from the conveyance speeds by said workpiece delivery conveyor, a space between the  
10 consecutively advancing workpieces along the workpiece drive cam ever changing by the change to the speed of travel by the consecutively advancing workpiece stabilizers.

2. The combination according to claim 1 further including conveyance guides engaged with the workpiece stabilizers for maintaining the cam followers drivingly engaged with said cam track.

15 3. The combination according to claim 2 wherein said conveyance guides include guide rollers mounted on said workpiece stabilizers; and endless cam tracks in spaced apart horizontal housing plates for orbiting movement of said workpiece stabilizers into and out of the flow path of a workpiece on said delivery conveyor.

4. The combination according to claim 1 wherein said decorating machine  
20 includes a plurality of decorating stations preceded by a registration station all horizontally spaced along said decorator conveyor, said decorator conveyor including horizontal workpiece carriers displaced by a continuous motion cam track constructed with a dwell period at each of

said stations for independently presenting a workpiece on said horizontal carriers to register the orientation of the workpiece and apply decoration to the workpieces on said horizontal workpiece carriers.

5. A bottle steady for workpieces in a decorating machine, said bottle steady including the combination of:
  - a workpiece conveyor for a decorator;
  - a plurality of independent workpiece stabilizers to support workpieces during a change to speed of travel relative to a conveyance speed by said conveyor, each of said workpiece stabilizers including a cam follower and workpiece stabilizer guides;
  - 10 at least one workpiece drive cam having a cam track receiving cam followers of said a plurality of independent workpiece stabilizers for changing the speed of travel by workpieces supported by said plurality of independent workpiece stabilizers between entry and discharge speeds one of which corresponds to and the other differs from said conveyance speed by said workpiece conveyor, space between the consecutively advancing workpieces along said
  - 15 workpiece drive cam every changing by the change to the speed of travel by the consecutively advancing workpieces;
    - a drive to rotate said workpiece drive cam; and
    - conveyance guides engaged with said workpiece stabilizer guides for maintaining said cam follower of each of said independent workpiece stabilizers drivingly engaged with said
  - 20 cam track.

6. The bottle steady according to claim 5 wherein said cam track comprises a continuous groove in each of parallel spaced apart barrel cams, and wherein said bottle steady

further includes stabilizer return discs and stabilizer feed discs for transferring said independent workpiece stabilizers from one of said barrel cams to the other of said barrel cams.

7. The bottle steady according to claim 6 wherein said workpiece stabilizer guides include horizontal and vertical guides engaged with drive tracks encircling a path of travel  
5 by each of said workpiece stabilizers driven by said barrel cams and said carrier discs.

8. The bottle steady according to claim 7 wherein said horizontal and vertical guides are formed by vertically spaced apart housing plates to extend along opposite ends of said plurality of said workpiece stabilizers to capture said carrier guide members on said workpiece stabilizers and to prevent dislodgment of the stabilizers from said guides.

10 9. The bottle steady according to claim 8 wherein said horizontal guide includes vertically spaced and opposing vertical guide surfaces and said vertical guide includes a horizontal face surface segments of said housing plates.

15 10. The bottle steady according to claim 5 wherein said plurality of independent workpiece stabilizers include vertical carriers having an elongated vertical carrier plate slideably supporting an upper carrier having mounted thereon a receptacle for engagement with an upper portion of a workpiece while supported on said conveyor.

11. The bottle steady according to claim 10 wherein said vertical carriers further include vertically spaced apart guide rollers at opposite lateral sides of said upper carrier.

20 12. The bottle steady according to claim 5 wherein said vertical carriers further include a base member to releasably advance a workpiece along said conveyor while decelerated by said workpiece drive cam to a speed matching relation between the workpiece and the conveyor.

25 13. The bottle steady according to claim 10 further including a cam track engaged with a cam follower supported by said upper carrier for displacing said receptacle between a workpiece engaging position and workpiece release position.

14. The bottle steady according to claim 13 further including drive means for adjustably positioning said cam track at a desired elevation above said conveyor.

15. The Apparatus for decorating workpieces, said apparatus including the combination of:

5           a decorator having horizontal workpiece carriers for transporting workpieces to and from at least one decorating station;

feed and discharge conveyors for supplying workpieces to said decorator;

10          a plurality of independent workpiece stabilizers to support workpieces during a change to a speed of travel relative to a conveyance speed by at least one of said feed and discharge conveyors, each of said workpiece stabilizers including a cam follower and workpiece stabilizer guides;

15          at least one workpiece drive cam having a cam track receiving cam followers of said a plurality of independent workpiece stabilizers for changing the speed of travel by workpieces supported by said plurality of independent workpiece stabilizers between entry and discharge speeds one of which corresponds to and the other differs from said conveyance speed by at least one of said feed and discharge conveyors, space between the consecutively advancing workpieces along said workpiece drive cam ever changing by the change to the speed of travel by the consecutively advancing workpieces;

20          a drive to rotate said workpiece drive cam; and

conveyance guides engaged with said workpiece stabilizer guides for maintaining said cam follower of each of said independent workpiece stabilizers drivingly engaged with said cam track.

16. An apparatus to establish a predetermined orientation of a surface of a workpiece to receive decoration relative to printing stations of an intermittent decorating machine, said intermittent decorating machine including a plurality of horizontally spaced apart decorating stations preceded by a registration station; a workpiece carrier having chucks to independently rotatably support each workpiece while residing at each of said stations; and, a workpiece feed cam for advancing said workpiece carrier along said stations, said workpiece feed cam including a continuous motion cam track with a dwell period at each of said stations for presenting a workpiece on said workpiece carrier to register the orientation of the workpiece at said registration station and apply decoration to the workpiece at each of said horizontally spaced apart decorating stations.

17. The apparatus according to claim 16 further including an operating system for reducing the clamping pressure applied to the workpieces by said chucks at said registration station during workpiece orientation.

18. The apparatus according to claim 17 further including drives for rotating a workpiece supported by said chucks on said workpiece carrier; and, a registration member responsive to a predetermined site on said workpiece for stopping rotation of a workpiece by one of said drives at said registration station to establish the predetermined orientation of a surface of the workpiece to receive decoration at said printing stations.

19. The apparatus according to claim 18 further including a resilient member for applying a clamping pressure against a workpiece supported by said chucks, said operating system including an actuator for reducing said clamping pressure at said registration station.

20. A method to stabilize the movement of a workpiece in the flow path of a conveyor for workpieces in a decorating machine, said method including the steps of:

depositing a workpiece having an elongated central axis on a moving conveyor with the elongated central axis extending vertically;

5                   engaging the workpiece at vertically spaced sites; and

driving the workpiece along said conveyor to change the speed of travel between entry and discharge speeds one of which corresponds to and the other differs from the conveyance speed by said conveyor.

21. The method to stabilize the movement of a workpiece according to claim 20  
10 wherein said step of in the flow path of depositing a workpiece includes depositing a succession of workpieces at spaced apart intervals of time; and wherein space between the consecutively advancing workpieces along said conveyor ever changing by the change to the speed of travel by the consecutively advancing workpieces.

22. The method to stabilize the movement of a workpiece according to claim 20  
15 wherein said conveyor moves at a constant speed.

23. A method to establish a predetermined orientation of a surface of a workpiece to receive decoration relative to printing stations of an intermittent decorating machine, said method including the steps of providing an intermittent decorating machine having a plurality of horizontally spaced apart decorating stations preceded by a registration station; rotatably supporting each of a plurality of workpieces to independently rotate about elongated central axis of the workpieces while residing at each of said stations; and, using a workpiece feed cam for advancing said workpieces along said stations, said workpiece feed cam including a continuous

motion cam track with a dwell period at each of said stations for presenting a workpiece to register the orientation of the workpiece at said registration station and apply decoration to the workpieces at each of said horizontally spaced apart decorating stations.

24. The method according to claim 23 wherein said register the orientation of the  
5 workpiece at said registration station establishes a predetermined orientation of each workpiece with respect to each decorating station, said method including the further step of controlling rotation of each workpiece advancing to and from said decorating stations to retain use of said predetermined orientation at each of said decorating stations.